

WHAT IS CLAIMED IS:

1. A vehicle driving force control apparatus for a vehicle having a wheel, a drive source configured to supply the wheel with a drive torque, and a clutch disposed in a torque transfer path from the drive source to the wheel, the vehicle driving force control apparatus comprising:
 - a transition determining section configured to output a transition determination upon determining a transition condition indicating cease of the drive torque from the drive source to the wheel, while the vehicle is traveling; and
 - a clutch release section configured to disengage the clutch, upon the drive torque of the drive source substantially reaching a target drive torque in which a difference between an output torque of the clutch and an input torque of the clutch is smaller than a prescribed value in response to the transition determination by the transition determining section.
- 15 2. The vehicle driving force control apparatus as recited in claim 1, wherein the prescribed value is substantially equals zero.
3. The vehicle driving force control apparatus as recited in claim 1, further comprising
 - 20 a drive torque control section configured to adjust the target drive torque in response to the transition determination by the transition determining section.
4. The vehicle driving force control apparatus as recited in claim 3, wherein the drive torque control section is further configured to substantially maintain the drive torque of the drive source substantially at the target drive torque at least during a delay period after issuance of a control command to release the clutch and until the clutch is released.

5. The vehicle driving force control apparatus as recited in claim 3, wherein
the drive torque control section is further configured to substantially maintain the
drive torque of the drive source substantially at the target drive torque at issuance of a
control command to release the clutch and until the clutch is released.

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6. The vehicle driving force control apparatus as recited in claim 3, wherein
the drive torque control section is further configured to substantially maintain the
drive torque of the drive source substantially at the target drive torque prior to start of a
release operation of the clutch and until the clutch is released.

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7. The vehicle driving force control apparatus as recited in claim 3, wherein
the drive torque control section starts the clutch disengagement operation, upon the
drive torque of the drive source substantially reaching the target drive torque.

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8. The vehicle driving force control apparatus as recited in claim 3, wherein
the drive torque control section is further configured to reduce the drive torque of
the drive source within a reduction range that the drive torque of the drive source can be
stably controlled when the drive torque of the drive source is larger than the target drive
torque after the transition determination by the transition determining section to cease the
drive torque of the drive source to the wheel until the clutch is released.

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9. The vehicle driving force control apparatus as recited in claim 8, wherein
the drive torque control section is further configured to reduce the drive torque of
the drive source within the reduction range at a predetermined reduction rate.

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10. The vehicle driving force control apparatus as recited in claim 8, wherein
the drive torque control section is further configured to reduce the drive torque of
the drive source until the clutch is released by controlling a field current of an electric
motor of the drive source of the vehicle to a predetermined field current value.

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11. The vehicle driving force control apparatus as recited in claim 10, wherein
the drive torque control section is further configured to setting an armature current
command value of an armature current of the drive source to substantially equal a
predetermined end-time armature current value that the drive source requires to output the
5 target drive torque when the field current of the drive source is substantially equal to the
predetermined field current value.
12. The vehicle driving force control apparatus as recited in claim 9, wherein
the clutch release section is further configured to set the target drive torque on a
10 generation capacity of a generator that supplies electricity to an electric motor of the drive
source.
13. The vehicle driving force control apparatus as recited in claim 9, wherein
the drive torque control section is further configured to set the target drive torque
15 based on a generation capacity of a generator that supplies electricity to an electric motor
of the drive source prior to the transition determination by the transition determining
section.
14. The vehicle driving force control apparatus as recited in claim 3, further
20 comprising
an output torque control section configured to control a driving torque of a
secondary driving source to a target drive torque command value;
a generation capacity reduction detection section configured to detect whether an
electrical capacity of a power source to supply power to the drive source decreases to an
25 insufficient power state in which the power source cannot supply sufficient power to
output the driving torque of the secondary driving source to a level substantially equal to
the target drive torque command value; and
an output torque command limiting section configured to limit the target drive
torque command value, when the transition determining section determines the transition
30 condition indicating cease the drive torque of the drive source to the wheel, based on
detecting that the drive torque of the drive source is decreasing, and when the generation

capacity reduction detection section detects that the electrical capacity decreases to the insufficient power state, while the vehicle is traveling.

15. The vehicle driving force control apparatus as recited in claim 14, wherein
5 the output torque control section is further configured to reduce the target drive torque command value at a prescribed reduction rate, when the transition determining section detects that the drive torque of the drive source is decreasing, and when the generation capacity reduction detection section detects that the generation capacity decreases to the insufficient power state, while the vehicle is traveling; and
10 the output torque command limiting section is further configured to control the target drive torque command value by increasing the prescribed reduction rate, when the generation capacity reduction detection section detects that the generation capacity decreases to the insufficient power state.
- 15 16. A vehicle driving force control apparatus as recited in claim 14, wherein
the generation capacity reduction detection section is further configured to determine that the generation capacity decreases, based on detecting an upshift in an automatic transmission of the vehicle provided between the drive source and the drive wheel.
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17. The vehicle driving force control apparatus as recited in claim 14, wherein
the generation capacity reduction detection section is further configured to determine that the generation capacity decreases, when a rotational speed of a generator of the power source is detected to be below a prescribed rotational speed.
- 25 18. The vehicle driving force control apparatus as recited in claim 14, wherein
the generation capacity reduction detection section is further configured to determine that the generation capacity decreases, when a rotational speed of the drive source is detected to be below a prescribed rotational speed.
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19. The vehicle driving force control apparatus as recited in claim 8, wherein
the drive torque control section is further configured to control the drive torque of
the drive source within the reduction range at a first predetermined reduction rate during a
first control period and at a second predetermined reduction rate during a second control
5 period before the clutch is released.

20. The vehicle driving force control apparatus as recited in claim 19, wherein
the drive torque control section is further configured to control the drive torque of
the drive source during the first and second periods after issuance of a control command to
10 release the clutch.

21. The vehicle driving force control apparatus as recited in claim 19, wherein
the drive torque control section is further configured to control the drive torque of
the drive source such that the second predetermined reduction rate during the second
15 period maintains the drive torque substantially constant before the clutch is released.

22. The vehicle driving force control apparatus as recited in claim 21, wherein
the drive torque control section is further configured to reduce the drive torque of
the drive source to the clutch such that the drive torque of the drive source is controlled to
20 substantially equal the target drive torque by controlling a field current command value of
the field current of the drive source to the predetermined field current value.

23. The vehicle driving force control apparatus as recited in claim 22, wherein
the drive torque control section is further configured to setting an armature current
25 command value of an armature current of the drive source to substantially equal a
predetermined end-time armature current value that the drive source requires to output the
target drive torque when the field current of the drive source is substantially equal to the
predetermined field current value.

24. The vehicle driving force control apparatus as recited in claim 3, wherein the drive torque control section is further configured to control the drive torque of the drive source until the clutch is released by controlling a field current of a power source of the drive source of the vehicle to a predetermined value.

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25. The vehicle driving force control apparatus as recited in claim 3, wherein the drive torque control section is further configured to reduce the drive torque of the drive source to the clutch such that the drive torque of the drive source is an output motor torque of a power source which is controlled to substantially equal the target drive torque by controlling a field current command value of the field current of power source to a predetermined field current value.

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26. The vehicle driving force control apparatus as recited in claim 3, wherein the drive torque control section is further configured to control the drive torque of the drive source until the clutch is released by setting an armature current command value of an armature current of an electric motor substantially equal to an end-time armature current value immediately after the transition determining section outputs the transition determination.

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27. The vehicle driving force control apparatus as recited in claim 3, wherein the clutch release section is further configured to estimate a convergence time for fluctuations in the drive torque of the drive source to converge within a prescribed allowable range, and output a command value for releasing the clutch such that the clutch is released after the convergence time has elapsed based on the estimate.

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28. The vehicle driving force control apparatus as recited in claim 1, further comprising

a clutch-release torque correction section configured to correct the target drive torque in accordance with a vehicle body acceleration of the vehicle.

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29. The vehicle driving force control apparatus as recited in claim 1, wherein
the transition determining section is further configured to determine the transition
condition indicating cease the drive torque of the drive source to the wheel based on
determining that the drive torque of the drive source is decreasing, while the vehicle is
5 traveling.

30. The vehicle driving force control apparatus as recited in claim 1, wherein
the transition determining section is further configured to determine the transition
condition indicating cease the drive torque of the drive source to the wheel based on
10 detecting a field current value of the drive source that corresponds to the drive torque at
which an armature current value of the drive torque become equal to a predetermined end-
time armature current value, while the vehicle is traveling.

31. The vehicle driving force control apparatus as recited in claim 1, wherein
15 the transition determining section is further configured to determine the transition
condition indicating cease the drive torque of the drive source to the wheel based on
detecting a prescribed motor torque of the drive source that corresponds to the drive torque
at which an armature current value to become equal to a predetermined end-time armature
current value, while the vehicle is traveling.

20 32. The vehicle driving force control apparatus as recited in claim 1, wherein
the transition determining section is further configured to determine the transition
condition indicating cease the drive torque of the drive source to the wheel based on
detecting an armature current value of the drive source that corresponds to a
25 predetermined end-time armature current value, while the vehicle is traveling.

33. The vehicle driving force control apparatus as recited in claim 1, wherein
the transition determining section is further configured to determine the transition
condition indicating cease the drive torque of the drive source to the wheel based on
30 detecting that the drive torque of the drive source has substantially reached the target drive
torque, while the vehicle is traveling.

34. The vehicle driving force control apparatus as recited in claim 1, further comprising

an electric motor that forms part of the drive source.

5 35. The vehicle driving force control apparatus as recited in claim 34, wherein the prescribed value is substantially equals zero.

36. The vehicle driving force control apparatus as recited in claim 34, further comprising

10 a drive torque control section configured to adjust the target drive torque in response to the transition determination by the transition determining section.

15 37. The vehicle driving force control apparatus as recited in claim 36, wherein the drive torque control section is further configured to substantially maintain the drive torque of the electric motor substantially at the target drive torque at least during a delay period after issuance of a control command to release the clutch and until the clutch is released.

20 38. The vehicle driving force control apparatus as recited in claim 36, wherein the drive torque control section is further configured to substantially maintain the drive torque of the electric motor substantially at the target drive torque at issuance of a control command to release the clutch and until the clutch is released.

25 39. The vehicle driving force control apparatus as recited in claim 36, wherein the drive torque control section is further configured to substantially maintain the drive torque of the electric motor substantially at the target drive torque prior to start of a release operation of the clutch and until the clutch is released.

30 40. The vehicle driving force control apparatus as recited in claim 36, wherein the drive torque control section starts the clutch disengagement operation, upon the drive torque of the electric motor substantially reaching the target drive torque.

41. The vehicle driving force control apparatus as recited in claim 36, wherein
the drive torque control section is further configured to reduce the drive torque of
the electric motor within a reduction range that the drive torque of the electric motor can
be stably controlled when the drive torque of the electric motor is larger than the target
5 drive torque after the transition determination by the transition determining section to
cease the drive torque of the electric motor to the wheel until the clutch is released.

42. The vehicle driving force control apparatus as recited in claim 41, wherein
the drive torque control section is further configured to reduce the drive torque of
10 the electric motor within the reduction range at a predetermined reduction rate.

43. The vehicle driving force control apparatus as recited in claim 41, wherein
the drive torque control section is further configured to reduce the drive torque of
the electric motor until the clutch is released by controlling a field current of the electric
15 motor of the vehicle to a predetermined field current value.

44. The vehicle driving force control apparatus as recited in claim 43, wherein
the drive torque control section is further configured to setting an armature current
command value of an armature current of the electric motor to substantially equal a
20 predetermined end-time armature current value that the electric motor requires to output
the target drive torque when the field current of the electric motor is substantially equal to
the predetermined field current value.

45. The vehicle driving force control apparatus as recited in claim 42, wherein
25 the clutch release section is further configured to set the target drive torque on a
generation capacity of a generator that supplies electricity to the electric motor.

46. The vehicle driving force control apparatus as recited in claim 42, wherein
the drive torque control section is further configured to set the target drive torque
30 based on a generation capacity of a generator that supplies electricity to the electric motor
prior to the transition determination by the transition determining section.

47. The vehicle driving force control apparatus as recited in claim 36, further comprising

an output torque control section configured to control a driving torque of a secondary driving source to a target drive torque command value;

- 5 a generation capacity reduction detection section configured to detect whether a electrical capacity of a power source to supply power to the electric motor decreases to an insufficient power state in which the power source cannot supply sufficient power to output the driving torque of the secondary driving source to a level substantially equal to the target drive torque command value; and
- 10 an output torque command limiting section configured to limit the target drive torque command value, when the transition determining section determines the transition condition indicating cease the drive torque of the electric motor to the wheel, based on detecting that the drive torque of the electric motor is decreasing, and when the generation capacity reduction detection section detects that the electrical capacity decreases to the insufficient power state, while the vehicle is traveling.
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48. The vehicle driving force control apparatus as recited in claim 47, wherein the output torque control section is further configured to reduce the target drive torque command value at a prescribed reduction rate, when the transition determining

- 20 section detects that the drive torque of the electric motor is decreasing, and when the generation capacity reduction detection section detects that the generation capacity decreases to the insufficient power state, while the vehicle is traveling; and
the output torque command limiting section is further configured to control the target drive torque command value by increasing the prescribed reduction rate, when the
25 generation capacity reduction detection section detects that the generation capacity decreases to the insufficient power state.

49. A vehicle driving force control apparatus as recited in claim 47, wherein the generation capacity reduction detection section is further configured to
30 determine that the generation capacity decreases, based on detecting an upshift in an automatic transmission of the vehicle provided between the electric motor and the drive wheel.

50. The vehicle driving force control apparatus as recited in claim 47, wherein
the generation capacity reduction detection section is further configured to
determine that the generation capacity decreases, when a rotational speed of a generator of
5 the power source is detected to be below a prescribed rotational speed.

51. The vehicle driving force control apparatus as recited in claim 47, wherein
the generation capacity reduction detection section is further configured to
determine that the generation capacity decreases, when a rotational speed of the electric
10 motor is detected to be below a prescribed rotational speed.

52. The vehicle driving force control apparatus as recited in claim 41, wherein
the drive torque control section is further configured to control the drive torque of
the electric motor within the reduction range at a first predetermined reduction rate during
15 a first control period and at a second predetermined reduction rate during a second control
period before the clutch is released.

53. The vehicle driving force control apparatus as recited in claim 52, wherein
the drive torque control section is further configured to control the drive torque of
20 the electric motor during the first and second periods after issuance of a control command
to release the clutch.

54. The vehicle driving force control apparatus as recited in claim 52, wherein
the drive torque control section is further configured to control the drive torque of
25 the electric motor such that the second predetermined reduction rate during the second
period maintains the drive torque substantially constant before the clutch is released.

55. The vehicle driving force control apparatus as recited in claim 54, wherein
the drive torque control section is further configured to reduce the drive torque of
30 the electric motor to the clutch such that the drive torque of the electric motor is controlled
to substantially equal the target drive torque by controlling a field current command value
of the field current of the electric motor to the predetermined field current value.

56. The vehicle driving force control apparatus as recited in claim 55, wherein
the drive torque control section is further configured to setting an armature current
command value of an armature current of the electric motor to substantially equal a
5 predetermined end-time armature current value that the electric motor requires to output
the target drive torque when the field current of the electric motor is substantially equal to
the predetermined field current value.

57. The vehicle driving force control apparatus as recited in claim 36, wherein
10 the drive torque control section is further configured to control the drive torque of
the electric motor until the clutch is released by controlling a field current of a power
source of the electric motor of the vehicle to a predetermined value.

58. The vehicle driving force control apparatus as recited in claim 36, wherein
15 the drive torque control section is further configured to reduce the drive torque of
the electric motor to the clutch such that the drive torque of the electric motor is an output
motor torque of a power source which is controlled to substantially equal the target drive
torque by controlling a field current command value of the field current of power source to
a predetermined field current value.

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59. The vehicle driving force control apparatus as recited in claim 36, wherein
the drive torque control section is further configured to control the drive torque of
the electric motor until the clutch is released by setting an armature current command
value of am armature current of an electric motor substantially equal to an end-time
25 armature current value immediately after the transition determining section outputs the
transition determination.

60. The vehicle driving force control apparatus as recited in claim 36, wherein
the clutch release section is further configured to estimate a convergence time for
30 fluctuations in the drive torque of the electric motor to converge within a prescribed
allowable range, and output a command value of the clutch release such that the clutch is
released after the convergence time has elapsed based on the estimate.

61. The vehicle driving force control apparatus as recited in claim 34, further comprising

5 a clutch-release torque correction section configured to correct the target drive torque in accordance with a vehicle body acceleration of the vehicle.

62. The vehicle driving force control apparatus as recited in claim 34, wherein the transition determining section is further configured to determine the transition condition indicating cease the drive torque of the electric motor to the wheel based on
10 determining that the drive torque of the electric motor is decreasing, while the vehicle is traveling.

63. The vehicle driving force control apparatus as recited in claim 34, wherein the transition determining section is further configured to determine the transition
15 condition indicating cease the drive torque of the electric motor to the wheel based on detecting a field current value of the electric motor that corresponds to the drive torque at which an armature current value of the drive torque become equal to a predetermined end-time armature current value, while the vehicle is traveling.

20 64. The vehicle driving force control apparatus as recited in claim 34, wherein the transition determining section is further configured to determine the transition condition indicating cease the drive torque of the electric motor to the wheel based on detecting a prescribed motor torque of the electric motor that corresponds to the drive torque at which an armature current value to become equal to a predetermined end-time
25 armature current value, while the vehicle is traveling.

65. The vehicle driving force control apparatus as recited in claim 34, wherein the transition determining section is further configured to determine the transition condition indicating cease the drive torque of the electric motor to the wheel based on
30 detecting an armature current value of the electric motor that corresponds to a predetermined end-time armature current value, while the vehicle is traveling.

66. The vehicle driving force control apparatus as recited in claim 34, wherein
the transition determining section is further configured to determine the transition
condition indicating cease the drive torque of the electric motor to the wheel based on
detecting that the drive torque of the electric motor has substantially reached the target

5 drive torque, while the vehicle is traveling.

67. The vehicle driving force control apparatus as recited in claim 1, further
comprising

a drive mode selection section configured to select between a multi-wheel drive
10 mode and a non-all wheel drive mode, the multi-wheel drive mode driving at least the
wheel by the drive source through engagement of the clutch and an additional wheel
independently of engagement of the clutch, and the non-all wheel drive mode disengaging
the wheel from the drive source through disengagement of the clutch and driving the
additional wheel.

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68. The vehicle driving force control apparatus as recited in claim 67, further
comprising

an acceleration slippage detection section configured to detect if acceleration
slippage is occurring in the wheel that is driven by the drive source; and

20 the drive mode selection section being configured to select between the multi-
wheel drive mode and the non-all wheel drive mode based on detection of acceleration
slippage by the acceleration slippage detection section.

69. The vehicle driving force control apparatus as recited in claim 67, wherein
25 the drive mode selection section includes a drive mode switch to manually select
one of the multi-wheel drive mode and the non-all wheel drive mode.

70. The vehicle driving force control apparatus according to claim 67, wherein
an electric motor forms part of the drive source.

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71. The vehicle driving force control apparatus according to claim 70, wherein the electric motor is driven by a generator being driven by an internal combustion engine.

5 72. The vehicle driving force control apparatus as recited in claim 67, wherein the prescribed value is substantially equals zero.

73. The vehicle driving force control apparatus as recited in claim 67, further comprising

10 a drive torque control section configured to adjust the target drive torque in response to the transition determination by the transition determining section.

15 74. The vehicle driving force control apparatus as recited in claim 73, wherein the drive torque control section is further configured to substantially maintain the drive torque of the drive source substantially at the target drive torque at least during a delay period after issuance of a control command to release the clutch and until the clutch is released.

20 75. The vehicle driving force control apparatus as recited in claim 73, wherein the drive torque control section is further configured to substantially maintain the drive torque of the drive source substantially at the target drive torque at issuance of a control command to release the clutch and until the clutch is released.

25 76. The vehicle driving force control apparatus as recited in claim 73, wherein the drive torque control section is further configured to substantially maintain the drive torque of the drive source substantially at the target drive torque prior to start of a release operation of the clutch and until the clutch is released.

30 77. The vehicle driving force control apparatus as recited in claim 73, wherein the drive torque control section starts the clutch disengagement operation, upon the drive torque of the drive source substantially reaching the target drive torque.

78. The vehicle driving force control apparatus as recited in claim 73, wherein
the drive torque control section is further configured to reduce the drive torque of
the drive source within a reduction range that the drive torque of the drive source can be
stably controlled when the drive torque of the drive source is larger than the target drive
5 torque after the transition determination by the transition determining section to cease the
drive torque of the drive source to the wheel until the clutch is released.

79. The vehicle driving force control apparatus as recited in claim 78, wherein
the drive torque control section is further configured to reduce the drive torque of
10 the drive source within the reduction range at a predetermined reduction rate.

80. The vehicle driving force control apparatus as recited in claim 78, wherein
the drive torque control section is further configured to reduce the drive torque of
the drive source until the clutch is released by controlling a field current of an electric
15 motor of the drive source of the vehicle to a predetermined field current value.

81. The vehicle driving force control apparatus as recited in claim 80, wherein
the drive torque control section is further configured to setting an armature current
command value of an armature current of the drive source to substantially equal a
20 predetermined end-time armature current value that the drive source requires to output the
target drive torque when the field current of the drive source is substantially equal to the
predetermined field current value.

82. The vehicle driving force control apparatus as recited in claim 79, wherein
25 the clutch release section is further configured to set the target drive torque on a
generation capacity of a generator that supplies electricity to an electric motor of the drive
source.

83. The vehicle driving force control apparatus as recited in claim 79, wherein
30 the drive torque control section is further configured to set the target drive torque
based on a generation capacity of a generator that supplies electricity to an electric motor

of the drive source prior to the transition determination by the transition determining section.

84. The vehicle driving force control apparatus as recited in claim 83, further

5 comprising

an output torque control section configured to control a driving torque of a secondary driving source to a target drive torque command value;

a generation capacity reduction detection section configured to detect whether a

electrical capacity of a power source to supply power to the drive source decreases to an

10 insufficient power state in which the power source cannot supply sufficient power to output the driving torque of the secondary driving source to a level substantially equal to the target drive torque command value; and

an output torque command limiting section configured to limit the target drive torque command value, when the transition determining section determines the transition

15 condition indicating cease the drive torque of the drive source to the wheel, based on detecting that the drive torque of the drive source is decreasing, and when the generation capacity reduction detection section detects that the electrical capacity decreases to the insufficient power state, while the vehicle is traveling.

20 85. The vehicle driving force control apparatus as recited in claim 84, wherein

the output torque control section is further configured to reduce the target drive torque command value at a prescribed reduction rate, when the transition determining section detects that the drive torque of the drive source is decreasing, and when the generation capacity reduction detection section detects that the generation capacity

25 decreases to the insufficient power state, while the vehicle is traveling; and

the output torque command limiting section is further configured to control the target drive torque command value by increasing the prescribed reduction rate, when the generation capacity reduction detection section detects that the generation capacity decreases to the insufficient power state.

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86. A vehicle driving force control apparatus as recited in claim 84, wherein

the generation capacity reduction detection section is further configured to determine that the generation capacity decreases, based on detecting an upshift in an automatic transmission of the vehicle provided between the drive source and the drive wheel.

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87. The vehicle driving force control apparatus as recited in claim 84, wherein the generation capacity reduction detection section is further configured to determine that the generation capacity decreases, when a rotational speed of a generator of the power source is detected to be below a prescribed rotational speed.

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88. The vehicle driving force control apparatus as recited in claim 84, wherein the generation capacity reduction detection section is further configured to determine that the generation capacity decreases, when a rotational speed of the drive source is detected to be below a prescribed rotational speed.

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89. The vehicle driving force control apparatus as recited in claim 88, wherein the drive torque control section is further configured to control the drive torque of the drive source within the reduction range at a first predetermined reduction rate during a first control period and at a second predetermined reduction rate during a second control period before the clutch is released.

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90. The vehicle driving force control apparatus as recited in claim 89, wherein the drive torque control section is further configured to control the drive torque of the drive source during the first and second periods after issuance of a control command to release the clutch.

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91. The vehicle driving force control apparatus as recited in claim 89, wherein the drive torque control section is further configured to control the drive torque of the drive source such that the second predetermined reduction rate during the second period maintains the drive torque substantially constant before the clutch is released.

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92. The vehicle driving force control apparatus as recited in claim 91, wherein

the drive torque control section is further configured to reduce the drive torque of the drive source to the clutch such that the drive torque of the drive source is controlled to substantially equal the target drive torque by controlling a field current command value of the field current of the drive source to the predetermined field current value.

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93. The vehicle driving force control apparatus as recited in claim 92, wherein the drive torque control section is further configured to setting an armature current command value of an armature current of the drive source to substantially equal a predetermined end-time armature current value that the drive source requires to output the target drive torque when the field current of the drive source is substantially equal to the predetermined field current value.
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94. The vehicle driving force control apparatus as recited in claim 73, wherein the drive torque control section is further configured to control the drive torque of the drive source until the clutch is released by controlling a field current of a power source of the drive source of the vehicle to a predetermined value.
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95. The vehicle driving force control apparatus as recited in claim 73, wherein the drive torque control section is further configured to reduce the drive torque of the drive source to the clutch such that the drive torque of the drive source is an output motor torque of a power source which is controlled to substantially equal the target drive torque by controlling a field current command value of the field current of power source to a predetermined field current value.
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96. The vehicle driving force control apparatus as recited in claim 73, wherein the drive torque control section is further configured to control the drive torque of the drive source until the clutch is released by setting an armature current command value of an armature current of an electric motor substantially equal to an end-time armature current value immediately after the transition determining section outputs the transition determination.
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97. The vehicle driving force control apparatus as recited in claim 73, wherein

the clutch release section is further configured to estimate a convergence time for fluctuations in the drive torque of the drive source to converge within a prescribed allowable range, and output a command value of the clutch release such that the clutch is released after the convergence time has elapsed based on the estimate.

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98. The vehicle driving force control apparatus as recited in claim 67, further comprising

a clutch-release torque correction section configured to correct the target drive torque in accordance with a vehicle body acceleration of the vehicle.

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99. The vehicle driving force control apparatus as recited in claim 67, wherein the transition determining section is further configured to determine the transition condition indicating cease the drive torque of the drive source to the wheel based on determining that the drive torque of the drive source is decreasing, while the vehicle is traveling.

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100. The vehicle driving force control apparatus as recited in claim 67, wherein the transition determining section is further configured to determine the transition condition indicating cease the drive torque of the drive source to the wheel based on detecting a field current value of the drive source that corresponds to the drive torque at which an armature current value of the drive torque become equal to a predetermined end-time armature current value, while the vehicle is traveling.

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101. The vehicle driving force control apparatus as recited in claim 67, wherein the transition determining section is further configured to determine the transition condition indicating cease the drive torque of the drive source to the wheel based on detecting a prescribed motor torque of the drive source that corresponds to the drive torque at which an armature current value to become equal to a predetermined end-time armature current value, while the vehicle is traveling.

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102. The vehicle driving force control apparatus as recited in claim 67, wherein

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the transition determining section is further configured to determine the transition condition indicating cease the drive torque of the drive source to the wheel based on detecting an armature current value of the drive source that corresponds to a predetermined end-time armature current value, while the vehicle is traveling.

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103. The vehicle driving force control apparatus as recited in claim 67, wherein the transition determining section is further configured to determine the transition condition indicating cease the drive torque of the drive source to the wheel based on detecting that the drive torque of the drive source has substantially reached the target drive 10 torque, while the vehicle is traveling.

104. A vehicle driving force control apparatus for a vehicle provided with a wheel, a drive source configured to supply the wheel with a drive torque, and a clutch disposed in a torque transfer path from the drive source to the wheel, the vehicle driving force control apparatus comprising:

transition determining means for outputting a transition determination upon determining a transition condition indicating cease of the drive torque of the drive source to the wheel, while the vehicle is traveling; and
clutch release means for disengaging the clutch, upon the drive torque of the drive 20 source substantially reaching a target drive torque in which a difference between an output torque of the clutch and an input torque of the clutch is smaller than a prescribed value in response to the transition determination by the transition determining means.

105. A method of controlling a vehicle driving force of a vehicle provided with a wheel, a drive source configured to supply the wheel with a drive torque, and a clutch disposed in a torque transfer path from the drive source to the wheel, the vehicle driving force control apparatus comprising:

determining a transition condition indicating cease of the drive torque of the drive source to the wheel, while the vehicle is traveling;
30 outputting a transition determination upon the determining of the issuance of the control command; and

disengaging the clutch, upon the drive torque of the drive source substantially reaching a target drive torque in which a difference between an output torque of the clutch and an input torque of the clutch is smaller than a prescribed value in response to the transition determination.